

## **Teaching High School Math Effectively**

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### **Introduction**

In a study conducted by McCann Erickson a few years back, it was revealed that the Filipino youth of today are found to be highly sociable and interactive. They look at schools as ideal venues for socializing and creating connections with other people. The rapid rise of infrastructure as well as the development of technology has contributed to the waning interest of students in traditional methods of educating. According to research, “most teachers teach the way they learn”. Hence, how teachers were taught mathematics when they were students most likely affect the way they teach students today.

Nebres and Lee-Chua reported in their study:

*Filipinos in general have never been noted for mathematical ability. International surveys (including the Trends in Mathematics and Science Study, TIMSS 2004) have placed the country near the bottom; and local studies similarly reflect such performance -- by students and teachers alike.*

This study reveals that Filipino students are not yet globally competitive. Further in their study, they discussed national and local efforts to channel creative skills into mathematics and they considered “excellent master teachers” as one of the critical variables in successful high level problem solving.

### **Difficulties of Students**

In some ways, Ateneo students are similar to the students from Lupang Pangako. They also find it difficult to retain skills learned in previous

years such as performing operations on fractions and working with word problems. They also have difficulty focusing on very rigorous tasks such as proving concepts. They are easily bored by procedural discussions. They prefer applying the concepts without really understanding them, which explains why mistakes are committed when questions are posed differently from what they are used to. Tests that evaluate understanding of several concepts through synthesis questions also bring about poor results. Students can perform individual skills but find it challenging to address problems that need multiple-step solutions.

### **How does the Ateneo High School (AHS) Math Program address these weaknesses?**

*It is the goal of the Math Program to develop in the students their ability to think logically and critically by emphasizing the correct application of laws, properties and theorems, insisting on precision and accuracy and encouraging creative approaches in problem solving. The Program also hopes to equip the learners with the discipline and fundamental skills that will help them address problems they will encounter later on in the service of others.*

Throughout the years, several routines/practices have evolved among math teachers in the Ateneo High School. In an informal survey conducted among all the current fourth year students (420 total), we asked them what among these practices they find helpful in learning math. Based on the results, 85% of the students appreciate being given an idea as to what will happen next in terms of the subject matter. They ranked ***being given an overview of topics at the start of each term, stating objectives every period*** as well as ***assigning homework at the start of each session*** (rather than at the end) as very helpful in terms of learning the math concepts. This tells us that the students are also goal-oriented. They want to know what it is teachers want them to learn and how these lessons are interconnected. This is also the venue for teachers to let students realize the interconnections of math concepts in the different year-levels. How students perform combined operations in first year will affect how they solve equations in second year as well as fourth year. Their lessons on learning the formulas for special right triangles in geometry will affect how they learn trigonometric concepts in fourth year.

Eighty-three percent of the students also appreciate the practice of ***giving daily homework*** and having ***regular quizzes***. Contrary to common belief that students would rather not work outside school, this gives us

the impression that students realize that mathematics is a skill subject and therefore requires practice outside of school hours. Math teachers have devoted several hours a week for *study hall sessions* that provide students with a venue to answer more exercises while a teacher is around for questions or clarifications. These sessions are open to all students but priority is given to those students recommended by their teachers based on performance in class. These practices/structures ensure that students are able to practice skills learned as often as possible.

Ninety-two percent of the students prefer the use of *manipulatives, illustrations* and *visual aids* to deliver lessons. Teachers are encouraged to use colored chalk to highlight important concepts as well maximize the use of the overhead and LCD projectors in class in order to pique the interest of students through the use of colors and figures. In order to address boredom that might occur during a 50minute period, teachers also make use of different materials such as *factor tiles, 3-D representation of special products, graphing board, graphing softwares/calculators, construction* tools and the like.

Ninety percent of the students also find *having experiments or activities in class*, together with *using examples that they can easily relate to* as effective in helping them learn and appreciate the lesson. In the first year, the teacher conducts a variety of games. The use of illustration boards by each student helps the teacher monitor which students have understood the lesson and which ones still need extra exercises. In the second year, some of the examples of experiments done in class are: *Wrecktangles* as an introduction to linear equations and the *M&M Activity* as an introduction to statistics. During the discussion of word problems, teachers also keep in mind the *Think Philippines* thrust of the school when creating problems students can easily relate to and therefore understand better. In the third year, since the approach to geometry is inductive, students do *hands-on construction activities* to identify geometric concepts. In the fourth year, an experiment serves as a motivational activity for each function such as the *Raven & the Jug for linear functions, The Noodle Escapade* for graphs of trigonometric functions, etc. Teachers also incorporate the study of models for each type of function discussed in class. These activities also address the social need of students to build connections by working within small groups.

An interesting result of the survey was noted when students were asked as to the type of teacher that helps them learn math better. Ninety-seven percent of the students noted that they prefer the type of *teacher who exhibit knowledge of the subject matter as well as the capacity to explain*

**concepts clearly.** Lowest ranked among the traits were the 'extreme' types: lenient and strict teachers. This gives us the impression that students do not consider strictness, or lack of strictness, as a contributor to effective teaching. Rather, an organized teacher who can easily be approached and has a sense of humor is perceived to be a more effective teacher. This data is supported by the result of the study done on first year students last year by De Guzman, which concluded that students preferred knowing teachers who focus on helping students learn content and equate success when students master the subject.

### **Conclusion**

We live in a constantly evolving environment. Students adapt to this environment and so we encounter different types of learners every school year. It is important to continuously assess practices and techniques done by math teachers in order to be able to determine which is most effective in helping our present students learn mathematical concepts. Continuous teacher training is also essential in helping teachers cope with these changes. A lot of new developments are happening in the field of education and math teachers should be aware of these changes. Teachers should also be adept at the use of technology since this primary environment is where we find our students to be immersed in.